PC16DO

CANopen

IO Module

User Manual

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1. Introduction

The PC16DO module has 16 open drain MOSFET (N-TYPE) digital outputs. The outputs may be used to drive lamps or external relays when more drive capability is required. The outputs are isolated from the logic and they share a common negative terminal. Each output is protected against over current and voltage.

The module plugs into a special bus connector which fits inside the DIN rail. The power supply voltage and the CAN bus signals are connected via this bus connector.

The CAN interface is electrically isolated and is compliant with ISO 11898.

The module has been equipped with status led's which are used to indicate the status of the Inputs and communications. This visual indication assists with fault finding and diagnostics.

The CANopen node ID and bit rate can be setup by DIP switches or software.

2. Technical Specification

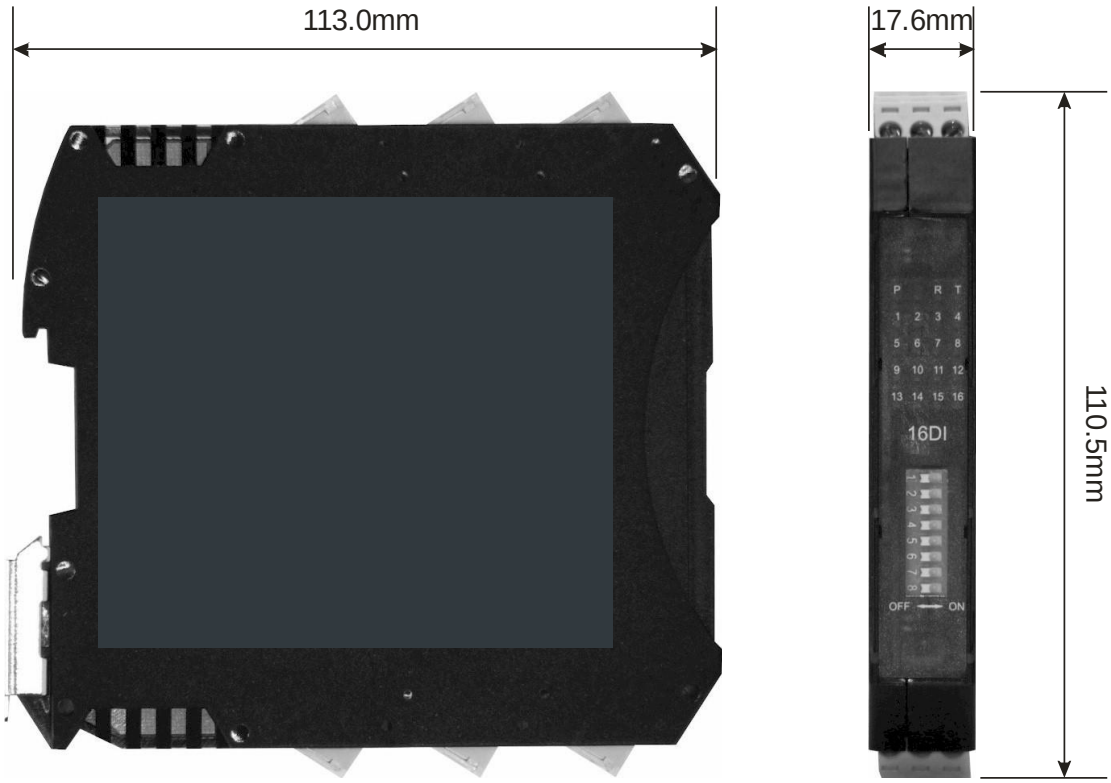
Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	37mA @ 12V / 21mA @ 24V
	Field Supply Voltage	12 -24 Vdc
	Field Supply Current	6mA @ 12V / 6mA @ 24V
Digital Outputs	Output Points	16
	Maximum Voltage	48 Vdc
	Maximum Current	0.5A per output
	On-state resistance	0.55 ohms
	Output update rate	< 1ms
	Isolation	1500Vrms between field and logic
CANopen Data	NMT	Slave
	Error Control	Node Guarding / Consumer Heartbeat
	Node ID	DIP switch or software
	Number of PDO	1 Rx
	PDO Modes	Event Controlled Asynchronous, Event Timer Asynchronous, Sync - Acyclic, Sync – Cyclic.
	PDO Mapping	Variable
	PDO Linking	Supported
	Number of SDO	1 Server
	Error Message	Yes
Temperature	Operating Temperature.	-20°C to + 70°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	5 way connector that clips onto DIN rail
	Inputs	6 x 3 Way screw connector on top and bottom

3. Physical Information

3.1 Physical Dimensions

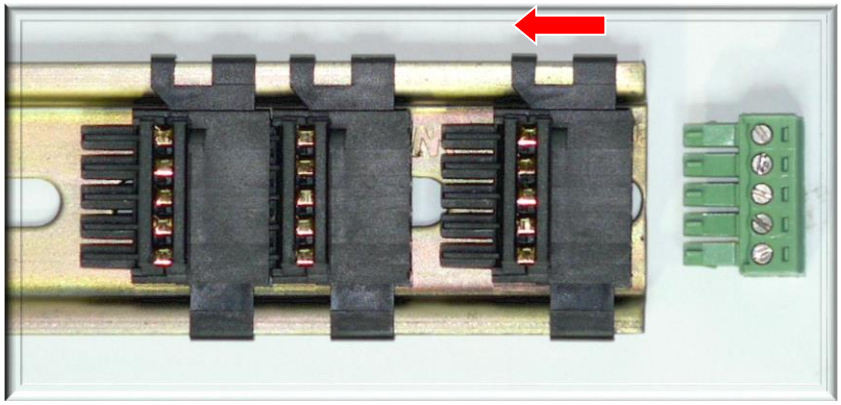
The PC16DO enclosure is shown below. The module clips directly onto an industry standard DIN rail. Field wiring is on the top and bottom of the module via 6 plug-in connectors. The module power and CAN communications wiring is on a separate connector which clips onto the DIN rail on the back of the housing.

Allow at least 25mm on top and below the module to accommodate the wiring. Ensure that enough space is kept above and below the module for good ventilation.



3.2 DIN rail Bus adaptor

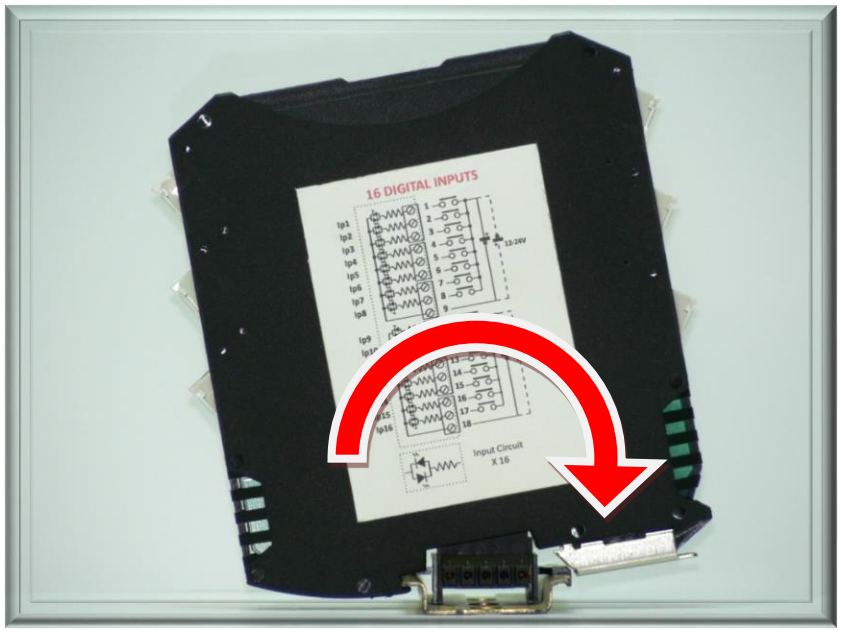
The BUS connector allows side-by-side installation of the Modules. The picture below shows multiple BUS connectors installed on a DIN rail. First, install the BUS connector onto the DIN rail, then slide into the adjacent BUS connector.



3.3 Installing the module onto the DIN rail

The modules are designed to be installed on a standard 35 mm DIN rail. Snap the BUS connector first into the rail as shown above. Next clip the top of the module onto the DIN rail and pivot the Module onto the DIN rail. The spring loaded clasp will latch around onto the DIN resulting in a firmly seated product. Do not force the module onto the connector otherwise the module or connector may be damaged.

Note: The modules are not designed for hot plug in. The power must be turned off before the modules are plugged into the base.



3.4 Removing the module from the DIN rail

To remove the module from the DIN Rail, use a flat blade screwdriver to pry the spring loaded clasp away from the DIN rail in the manner shown in the picture below. Next pivot the module up and away from the DIN rail and remove.

3.5 Grounding/Shielding

In most cases, the modules will be installed in an enclosure along with other devices which generate electromagnetic radiation. Examples of these devices are relays and contactors, transformers, motor controllers etc. This electromagnetic radiation can induce electrical noise into both power and signal lines, as well as direct radiation into the module causing negative effects on the system. Appropriate grounding, shielding and other protective steps should be taken at the installation stage to prevent these effects. These protective steps include control cabinet grounding, module grounding, cable shield grounding, protective elements for electromagnetic switching devices, correct wiring as well as consideration of cable types and their cross sections.

3.6 Network Termination

Transmission line effects often present a problem on data communication networks. These problems include reflections and signal attenuation.

To eliminate the presence of reflections from the end of the cable, the cable must be terminated at both ends with a resistor across the line equal to its characteristic impedance. Both ends must be terminated since the direction of propagation is bi-directional. This termination is typically 120 ohms.

4. Setting the Node ID and baud rate

The DIP switches are provided to manually configure the module node ID and baud rate. Switches 1 through 5 set the node ID sequentially starting at 1 and ending at 31. Switches 6, 7 & 8 set the baud rate. When the ID switches are all set to zero, the ID is taken from internal memory. When the baud rate switches are all set to zero, the baud rate is taken from the internal memory. The user must first configure the module by writing the correct values to the module.

4.1 Changing the DIP switch to set the Node ID and baud rate

The software in the module samples the dip switches on a reset when the power is cycled. Once sampled, the software writes the settings to the CAN port. The user is welcome to change the dip switches while the module is powered, however, a reset must be initiated afterward.

The DIP switch can be toggled using a small flat blade screwdriver, or equivalent tool, as shown in the picture below.

4.2 Setting the Node ID using the DIP switches

The following table assists with the setting up of DIP switches for the required NODE ID.

NODE ID	SWITCH SETTING							
	SW8	SW7	SW6	SW5	SW4	SW3	SW2	SW1
Software	-	-	-	Off	Off	Off	Off	Off
1	-	-	-	Off	Off	Off	Off	On
2	-	-	-	Off	Off	Off	On	Off
3	-	-	-	Off	Off	Off	On	On
4	-	-	-	Off	Off	On	Off	Off
4	-	-	-	Off	Off	On	Off	On
6	-	-	-	Off	Off	On	On	Off
-	-	-	-	-	-	-	-	-
31	-	-	-	On	On	On	On	On

4.3 Setting the Baud Rate using the DIP switches

The following table assists with the setting up of DIP switches for the required Baud Rate.

BAUD RATE	SWITCH SETTING							
kbits/s	SW8	SW7	SW6	SW5	SW4	SW3	SW2	SW1
Software	Off	Off	Off					
20	Off	Off	On	-	-	-	-	-
50	Off	On	Off	-	-	-	-	-
125	Off	On	On	-	-	-	-	-
250	On	Off	Off	-	-	-	-	-
500	On	Off	On	-	-	-	-	-
800	On	On	Off	-	-	-	-	-
1000	On	On	On	-	-	-	-	-

4.4 Setting the Node ID using software.

In order to use the node ID from memory, ensure that all of the node ID dip switches are in the OFF position.

Before the internal node id is selected, the user must first write the correct id value to the Module ID object in the manufacturer segment. The object address is 2001h.

The node id can be configured from 1 to 127.

4.5 Setting the baud rate using software.

In order to use the baud rate from memory, ensure that all of the baud rate dip switches are in the OFF position.

Before the internal baud rate is selected, the user must first write the correct baud rate value to the Module Baud Rate object in the manufacturer segment. The object address is 2002h.

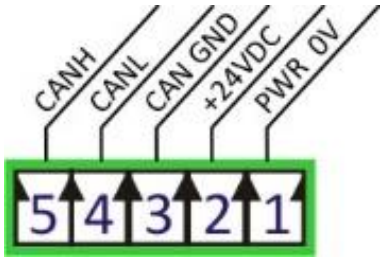
The following baud rates are supported.

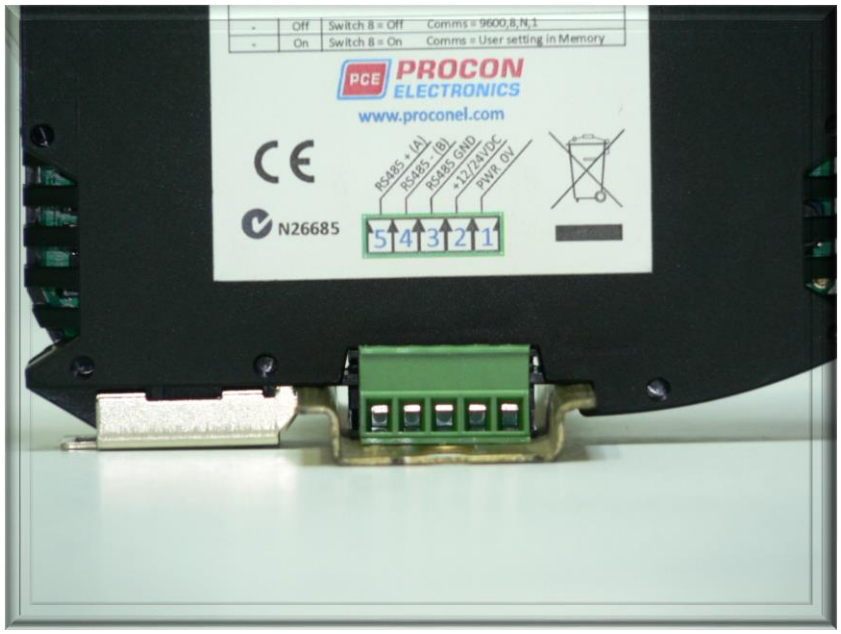
BAUD RATE	OBJECT VALUE (2002h)
kbits/s	
20	1
50	2
100	3
125	4
250	5
500	6
800	7
1000	8

5. Wiring

5.1 Power supply and Communications Wiring

The following diagram shows the wiring for the power and CAN communications.

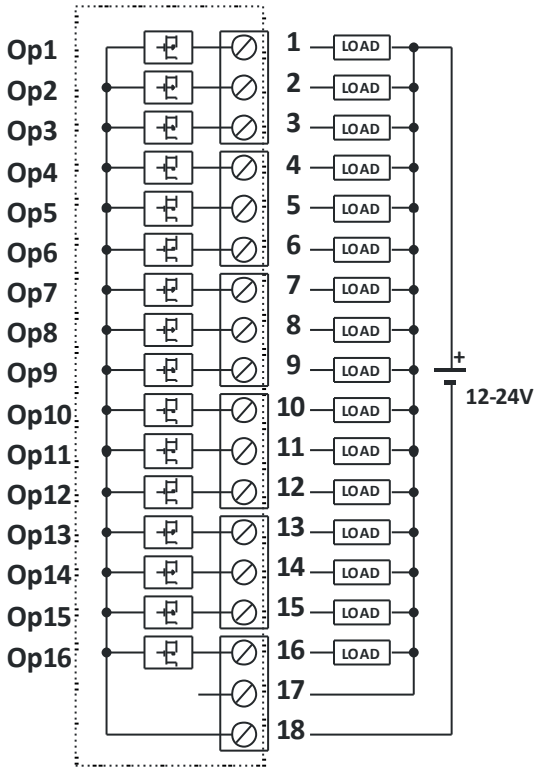




Terminal		Description
1	**Power 0V**	The DC power supply 0V connection.
2	**Power +24V**	The DC power supply positive connection. 12V to 24VDC.
3	**CAN GND**	The CAN circuit is isolated from the DC power supply for the module. The CAN GND connection is not connected to the DC power supply GND. Use a separate ground wire to connect all of the CAN GND terminals on the modules together. This ensures that all of the modules are at the same potential. The ground wire must be earthed at one end only.
4	**CANL**	CANL network connection
5	**CANH**	CANH network connection

5.2 Wiring the digital outputs

The following diagram shows how the digital outputs are connected to the coil of a relay. The coil is connected to positive and switched to negative.

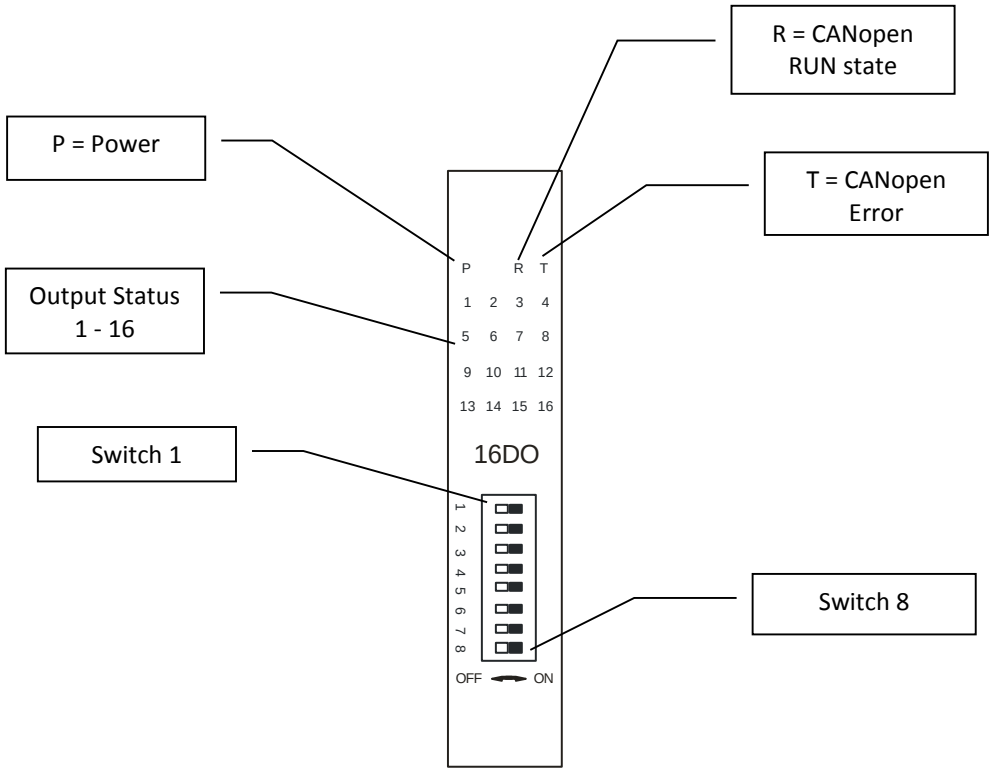


6. Indicators

6.1 Front panel indicators

The CAN communications uses an error LED (T) and a run LED (R). The run LED indicates the CANopen state. The error LED is shows errors of the network.

Power: Flashes to indicate the CPU is running.
CAN (R): Indicates the CANopen run state.
CAN (T): Indicates a CANopen error.
Output Status: "OFF" when the output is off
"ON" when the output is on.



6.2 Run indicator (R)

RUN LED	State	Description
Single flash	STOPPED	The device is in STOPPED state.
Blinking	PRE-OPERATIONAL	The device is in PRE- OPERATIONAL state.
On	RUN	The device is in RUN state.

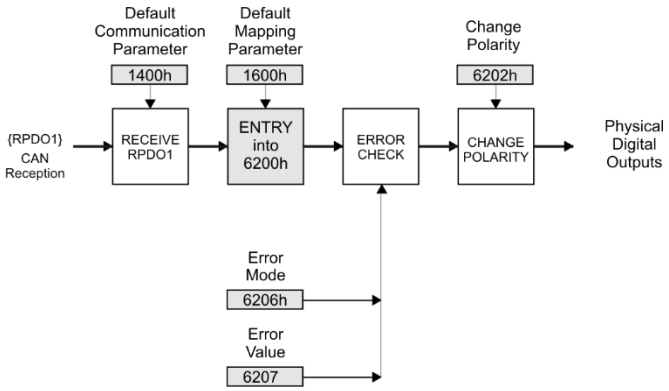
6.3 Error indicator (T)

ERROR LED	State	Description
Off	no error	The device is in working condition.
Single flash	warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning limit.
Double flash	Error Control Event	A guard event (NMT- Slave or NMT-Master) or a Heartbeat event has occurred.
On	Bus Off	The CAN controller is bus-off.

7. Implemented CANopen Objects

7.1 Object Block Diagrams

7.1.1 Block diagram for digital outputs



7.2 Communication Segment

7.2.1 Object 1000h: Device Type

The device type specifies the kind of device. The lower 16 bit contain the device profile number and the upper 16 bit an additional information.

INDEX	1000
Name	Device Type
Object Code	Variable
Data Type	UNSIGNED32
Access	CONST
PDO Mapping	No
Default Value	0x00020191

7.2.2 Object 1001h: Error Register

The error register is a field of 8 bits, each for a certain error type. If an error occurs the bit has to be set.

Bit	Meaning
0	generic error
1	-
2	-
3	-
4	communication error (overrun, error state)
5	-
6	-
7	-

INDEX	1001
Name	Error Register
Object Code	Variable
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Default Value	0x00

7.2.3 Object 1003h: Pre-defined Error Field

This object holds errors that have occurred on the device and have been signalled via Emergency Object. It is an error history.
Writing to sub index 0 deletes the entire error history.

ERROR	CODE
Communications Error	0x8100
CAN Overrun Error	0x8110
CAN in error passive	0x8120
Heart Beat or life guard error	0x8130
CAN recovered from bus-off	0x8140
PDO not processed due the length	0x8210
PDO length exceeded	0x8220

INDEX	1003
Name	Pre-defined Error Field
Object Code	Array
Data Type	UNSIGNED32

Sub-Index	000
Description	Number of Errors
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	001
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	002
Description	Standard Error Field
Data Type	UNSIGNED32

Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	003
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	004
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	005
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	006
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No

Default Value	0x00000000
Sub-Index	007
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	008
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	009
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000
Sub-Index	010
Description	Standard Error Field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000000

7.2.4 Object 1005h: COB-ID SYNC

COB-ID of the Synchronization object.
The device generates a SYNC message if bit 30 is set.
The meaning of other bits is equal to the other communication objects.

INDEX	1005
Name	COB-ID SYNC
Object Code	Variable
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000080

7.2.5 Object 1008h: Manufacturer Device Name

Contains the device name.

INDEX	1008
Name	Manufacturer Device Name
Object Code	Variable
Data Type	VISIBLE_STRING
Access	CONST
PDO Mapping	No
Default Value	PC16DO

7.2.6 Object 1009h: Manufacturer Hardware Version

Contains the device hardware version.

INDEX	1009
Name	Manufacturer Hardware Version
Object Code	Variable
Data Type	VISIBLE_STRING
Access	CONST
PDO Mapping	No
Default Value	V01.00

7.2.7 Object 100Ah: Manufacturer Software Version

Contains the device software version.

INDEX	100A
Name	Manufacturer Software Version
Object Code	Variable
Data Type	VISIBLE_STRING
Access	CONST
PDO Mapping	No
Default Value	V01.00

7.2.8 Object 100Ch: Guard Time

This entry contains the guard time in milli-seconds.
It is 0, if not used.

INDEX	100C
Name	Guard Time
Object Code	Variable
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x00000000
Unit	ms

7.2.9 Object 100Dh: Life Time Factor

The life time factor multiplied with the guard time gives the life time for the device.
It is 0, if not used.

INDEX	100D
Name	Life Time Factor
Object Code	Variable
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x00000000

7.2.10 Object 1010h: Store Parameter Field

This entry supports saving of parameters in non-volatile memory.
With a read access the device provides information about its saving capabilities. Several parameter groups are distinguished.

Sub index 1 : all parameters
Sub index 2 : communication parameters
Sub index 3 : application parameters
Sub index 4 - 127: manufacturer defined parameters

For saving the signature "save" (0x65766173) must be written.

The following parameters can be saved or loaded:

Communication Parameter	**Object**
COB-ID SYNC	1005h
Guard Time	100Ch
Life Time Factor	100Dh
COB-ID EMCY	1014h
Heartbeat Consumer Entries	1016h
Producer Heartbeat Time	1017h
PDO length exceeded	1029h
Manufacturer Specific Parameter	Object
Module ID	2001h
Module Baud Rate	2002h
Application Parameter	Object
Polarity 6 Output Lines	6202h
Error Mode 6 Output Lines	6206h
Fault State 6 Output Lines	6207h

INDEX	1010
Name	Store Parameter Field
Object Code	Array
Data Type	UNSIGNED32
Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x4

Sub-Index	001
Description	Save all Parameters

Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	002
Description	Save Communication Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	003
Description	Save Application Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	004
Description	Save Manufacturers Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

7.2.11 Object 1011h: Restore Default Parameters

This entry supports restoring of default parameters.
With a read access the device provides information about its capabilities to restore these values.
Several parameter groups are distinguished.

Sub index 1 : all parameters
Sub index 2 : communication parameters
Sub index 3 : application parameters
Sub index 4 - 127: manufacturer defined parameters

For restoring the signature "load" (0x64616f6c) must be written.

INDEX	1011
Name	Restore Default Parameters
Object Code	Array
Data Type	UNSIGNED32

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x4
Sub-Index	001
Description	Restore all Default Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	002
Description	Restore Communication Default Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

Sub-Index	003
Description	Restore Application Default Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	004
Description	Restore Manufacturers Default Parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

7.2.12 Object 1014h: COB-ID EMCY

COB-ID used for emergency message (Emergency Producer).

INDEX	1014
Name	COB-ID EMCY
Object Code	Variable
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000080

7.2.13 Object 1015h: Inhibit Time Emergency

Inhibit Time used for emergency message (Emergency Producer).
The time has to be a multiple of 100 us.

INDEX	1015
Name	Inhibit Time Emergency
Object Code	Variable
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0

7.2.14 Object 1016h: Heartbeat Consumer Entries

The consumer heartbeat time defines the expected heartbeat cycle time and thus has to be higher than the corresponding producer heartbeat time configured on the device producing this heartbeat.

The bits 31 - 24 of each sub-index has to be 0.
The bits 23 - 16 contain the node-id.
The lower 16 bits contain the heartbeat time

INDEX	1016
Name	Heartbeat Consumer Entries
Object Code	Array
Data Type	UNSIGNED32

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x02
Sub-Index	001
Description	Consumer Heartbeat Time 1
Data Type	UNSIGNED32

Access	RW
PDO Mapping	No
Default Value	0x00000000
Sub-Index	002
Description	Consumer Heartbeat Time 2
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000000

7.2.15 Object 1017h: Producer Heartbeat Time

The producer heartbeat time defines the cycle time of the heartbeat. If the time is 0 it is not used. The time has to be a multiple of 1 msec

INDEX	1017
Name	Producer Heartbeat Time
Object Code	Variable
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x00000000

7.2.16 Object 1018h: Identity Object

This object contains general information about the device.
Sub-Index 1 contains a unique value allocated each manufacturer.
Sub-Index 2 identifies the manufacturer specific product code (device version).
Sub-Index 3 contains the revision number. Bit 31-16 is the major revision number and Bit 15-0 the minor revision number.
Sub-Index 4 identified a manufacturer specific serial number.

INDEX	1018
Name	Identity Object
Object Code	Record
Data Type	IDENTITY

Sub-Index	000
Description	number of entries
Access	RO
PDO Mapping	No
Default Value	0x4
Sub-Index	001
Description	Vendor Id
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x000003AD
Sub-Index	002
Description	Product Code
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x0

Sub-Index	003
Description	Revision number
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x0
Sub-Index	004
Description	Serial number
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0

7.2.17 Object 1029h: Error Behaviour

Sub index 000 contains the number of error classes.
Sub index 001 contains the error class for a communication error.
Sub indices 001 to 254 contain device profile or manufacturer specific error classes.

The value of an error class can be:
0 = pre - operational
1 = no state change
2 = stopped
3 .. 127 reserved

INDEX	1029
Name	Error Behaviour
Object Code	Array
Data Type	UNSIGNED8

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	1
Sub-Index	001
Description	Communication Error
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x0

7.2.18 Object 1200h: Server SDO Parameter 1

The object contains the parameters for the SDOs for which the device is the server.

INDEX	1200
Name	Server SDO Parameter 1
Object Code	Record
Data Type	SDO_PARAMETER

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	2
Sub-Index	001
Description	COB-ID Client -> Server
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000600
Sub-Index	002
Description	COB-ID Server -> Client
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Default Value	0x00000580

7.2.19 Object 1400h: Receive PDO Communication Parameter 1

It contains the communication parameters of the current PDO the device is able to receive.
Sub-index 0 contains the number of PDO-parameters implemented.
Sub index 1 describes the COB-ID. If bit 31 is set the PDO is disabled.
The transmission mode is defined by sub-index 2.
An inhibit time can be defined on sub-index 3 in 100 us.
At the 5th sub-index can be defined an event time for asynchronous pdos.

INDEX	1400
Name	Receive PDO Communication Parameter 1
Object Code	Record
Data Type	PDO_COMM_PAR

Sub-Index	000
Description	Number of Entries
Access	RO
PDO Mapping	No
Default Value	0x03
Sub-Index	001
Description	COB-ID
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00000200
Sub-Index	002
Description	Transmission Type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0xFF

Sub-Index	003
Description	Inhibit Time
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Default Value	0x0
Unit	100 us

7.2.20 Object 1600h: Receive PDO Mapping Parameter 1

The sub-indices contain the indices, the sub-indices and the lengths of the mapped sub-indices.

Their structure is as follows:
index (16bit) sub-index (8bit) length (8bit)

INDEX	1600
Name	Receive PDO Mapping Parameter 1
Object Code	Record
Data Type	PDO_MAPPING

Sub-Index	000
Description	Number of Entries
Access	RW
PDO Mapping	No
Default Value	0x02
Sub-Index	001
Description	Mapping Entry 1
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x62000108

Sub-Index	002
Description	Mapping Entry 2
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x62000208
Sub-Index	003
Description	Mapping Entry 3
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008
Sub-Index	004
Description	Mapping Entry 4
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008
Sub-Index	005
Description	Mapping Entry 5
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008
Sub-Index	006
Description	Mapping Entry 6

Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008
Sub-Index	007
Description	Mapping Entry 7
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008
Sub-Index	008
Description	Mapping Entry 8
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Default Value	0x00050008

7.3 Manufacturer Segment

7.3.1 Object 2001h: Module ID

INDEX	2001
Name	Module ID
Object Code	Variable
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x7F

7.3.2 Object 2002h: Module Baud Rate

INDEX	2002
Name	Module Baud Rate
Object Code	Variable
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x04

7.3.3 Object 2003h: Module DIP Switch

INDEX	2003
Name	Module DIP Switch
Object Code	Variable
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Default Value	0x00

7.4 Device Profile Segment

7.4.1 Object 6020h: Read State 1 Input Line 1-6

7.4.2 Object 6200h: Write State 16 Output Lines

Sets a group of 8 output lines as a byte of information.

INDEX	6200
Name	Write State 8 Output Lines
Object Code	Array
Data Type	UNSIGNED8

Sub-Index	000
Description	Number of Elements
Access	RO
PDO Mapping	No
Default Value	0x2
Sub-Index	001
Description	digital Outputs 1-8
Data Type	UNSIGNED8
Access	RWW
PDO Mapping	Yes
Default Value	0
Sub-Index	002
Description	digital Outputs 9-16
Data Type	UNSIGNED8
Access	RWW
PDO Mapping	Yes
Default Value	0

7.4.3 Object 6202h: Polarity 16 Output Lines

Defines the polarity of a group of 6 output lines.

INDEX	6202
Name	Polarity 8 Output Lines
Object Code	Array
Data Type	UNSIGNED8

Sub-Index	000
Description	Number of Elements
Access	RO
PDO Mapping	No
Default Value	0x2
Sub-Index	001
Description	Polarity for digital Outputs 1-8
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x00
Sub-Index	002
Description	Polarity for digital Outputs 9-16
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x00

7.4.4 Object 6206h: Error Mode 16 Output Lines

This object indicates, whether an output is set to a pre-defined error value (see 6207 h object) in case of an internal device failure or a 'Stop Remote Node' indication.
1 = output value shall take the pre-defined condition specified in 6207 h object
0 = output value shall be kept if an error occurs

INDEX	6206
Name	Error Mode 8 Output Lines
Object Code	Array
Data Type	UNSIGNED8

Sub-Index	000
Description	Number of Elements
Access	RO
PDO Mapping	No
Default Value	0x2
Sub-Index	001
Description	Fault Mode for digital Outputs 1-8
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0xFF
Sub-Index	002
Description	Fault Mode for digital Outputs 9-16
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0xFF

7.4.5 Object 6207h: Fault State 16 Output Lines

Output line fault state. This defines the default output state on detecting a fault condition. Defined for groups of 8 outputs. The corresponding bit must be set in the default output line mode.

INDEX	6207
Name	Fault State 8 Output Lines
Object Code	Array
Data Type	UNSIGNED8

Sub-Index	000
Description	Number of Elements
Access	RO
PDO Mapping	No
Default Value	0x2
Sub-Index	001
Description	Fault State for digital Outputs 1-8
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x00
Sub-Index	002
Description	Fault State for digital Outputs 9-16
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Default Value	0x00

7.4.6 Object 6220h: Write State 1 Output Line 1-16

Sets a single output line information.

INDEX	6220
Name	Write State 1 Output Line 1-8
Object Code	Array
Data Type	BOOLEAN

Sub-Index	000
Description	Number of Elements
Access	RO
PDO Mapping	No
Default Value	0x10
Sub-Index	001
Description	digital Output 1
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	002
Description	digital Output 2
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	003
Description	digital Output 3

Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	004
Description	digital Output 4
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	005
Description	digital Output 5
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	006
Description	digital Output 6
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0

Sub-Index	007
Description	digital Output 7
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	008
Description	digital Output 8
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	009
Description	digital Output 9
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	010
Description	digital Output 10
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0

Sub-Index	011
Description	digital Output 11
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	012
Description	digital Output 12
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	013
Description	digital Output 13
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	014
Description	digital Output 14
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0

Sub-Index	015
Description	digital Output 15
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0
Sub-Index	016
Description	digital Output 16
Data Type	BOOLEAN
Access	RWW
PDO Mapping	No
Default Value	0

8. SAFETY GUIDELINES

8.1 Introduction

The IO Modules have been designed developed or manufactured for conventional use in industry. They were not designed, developed and manufactured for any use involving serious risks or hazards that without the implementation of exceptionally stringent safety precautions could lead to death, injury, serious physical damage or loss of any other kind. Such risks and hazards include in particular the use of these devices to monitor nuclear reactions in nuclear power plants, as well as flight control systems, flight safety, the control of mass transportation systems, medical life support systems, and the control of weapons systems.

When using IO Modules with programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a Soft PLC, the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) in accordance with applicable national and international regulations must be observed. The same applies for all other devices connected to the system, such as drives. All tasks such as installation, commissioning and service may only be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, mounting, installation, commissioning and operation of the product and have the appropriate qualifications. National accident prevention guidelines must be followed. The safety guidelines, connection descriptions and limit values listed in the technical data must be read carefully before installation and commissioning and must be observed.

8.2 Intended Use

Electronic devices are generally not fail-safe. In the event of a failure on the IO Modules, operating or monitoring device or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, such as motors, are made safe.

8.3 Transport and Storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere).

8.4 Installation

- The installation must take place according to the documentation.
- The IO Modules are only allowed to be installed without voltage applied and by qualified personnel.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.

Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).